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Rosenblattichthys nemotoi, a New Species of Scopelarchidae, from the South Indian Ocean Subtropical Convergence Zone

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Abstract *Rosenblattichthys nemotoi* is described from a single larval specimen, 37 mm SL (standard length) taken from the southern Indian Ocean Subtropical Convergence Zone. This species differs from all other *Rosenblattichthys* in meristic characters (25 anal-fin rays, 26 or 27 pectoral-fin rays), configuration of accessory pigment areas (two areas present; a dorsal area (DA) and a mid-lateral peduncular area (PDA), and nonprecocity of pectoral-fin development. All other records of *Rosenblattichthys* are from tropical or subtropical waters.

The scopelarchid genus *Rosenblattichthys* Johnson, 1974, currently contains three recognized species: *R. alatus* (Fourmanoir, 1970), *R. hubbsi* Johnson, 1974 and *R. volucris* (Rofen, 1966). The only published accounts of *Rosenblattichthys* are in Johnson (1974, 1982, 1984). The three currently-recognized species are entirely tropical-subtropical (*sensu* Johnson 1982: 185) in distribution. *R. volucris* is endemic to a portion of the eastern tropical Pacific (Johnson 1982: 164); *R. hubbsi* is subtropical in the North and South Atlantic, southern Indian and North Pacific oceans whereas *R. alatus* is tropical in the Indian and Pacific oceans with three records from the subtropical South Pacific (Johnson, 1982) including two new records (33°17′S and 34°10′S) off Sydney, NSW, Australia (Paxton, pers. comm.).

Research Vessel *Hakuho Maru* trawled a single larval specimen of *Rosenblattichthys* in the southern Indian Ocean Subtropical Convergence Zone. Larvae of all scopelarchid species (except *Scopelarchoides kreffti* Johnson, 1972) are well-known (Johnson, 1974, 1982, 1984) and evidence presented below leaves us with no doubt that the single 37.0 mm SL (standard length) specimen represents a fourth, previously-undescribed species of *Rosenblattichthys*. The purposes of this paper include description of this form, comparison of it with other *Rosenblattichthys* larvae, and brief comment (there is only one specimen) on its "distribution."

Methods

Methods and format of description are consistent with Johnson (1974, 1982).

Rosenblattichthys nemotoi sp. nov.
(Fig. 1)

Holotype. Field Museum of Natural History, FMNH 96512, larval specimen, 37.0 mm SL, taken by R.V. *Hakuho Maru*, Ocean Research Institute, University of Tokyo. KH-83-1, station 7, 44°48.4′S, 114°57.3′E, 10-ft (3 m), Isaacs-Kidd Midwater Trawl, oblique tow, 0–980 m, 00: 45–03: 10 h, 27 Jan. 1984.

Diagnosis. A species of *Rosenblattichthys* with 10 dorsal-fin rays, 25 anal-fin rays and 26 (possibly 27) pectoral-fin rays. Myotomes numbering at least 52. Only two larval pigment areas, a dorsal accessory area, DA, at dorsal contour, above anterior one-third of anal-fin base, and a lateral accessory pigment area, PDA, centered on the caudal peduncle just behind a vertical through posterior-most anal-fin-ray base. In combination these characters are unique to *R. nemotoi*.

Comparison with other species of *Rosenblattichthys*. *Rosenblattichthys nemotoi* has 10 dorsal-fin rays; *R. hubbsi* and *R. alatus* have only 8 or 9 dorsal-fin rays; *R. volucris* has 9 or 10 dorsal-fin rays. Of the other species of *Rosenblattichthys* only *R. hubbsi* has as many as 25 anal-fin rays (2 of 19 specimens counted) but it differs from *R. nemotoi* in having only 21 to 23 pectoral-fin rays. *R. nemotoi* differs from all other *Rosenblattichthys* in that the pectoral fin does not completely ossify before all other fins. In *R. nemotoi* as in larvae of all other scopelarchid genera (Johnson, 1974: 22) and indeed most inioms (Okiyama, 1984: 256), the ventral-most pectoral-fin rays are the last to differentiate. In the holotype of *R. nemotoi* the last 1 or 2 rays of pectoral fin are not yet differentiated. Each species of *Rosenblattichthys* possesses unique number and configuration of accessory

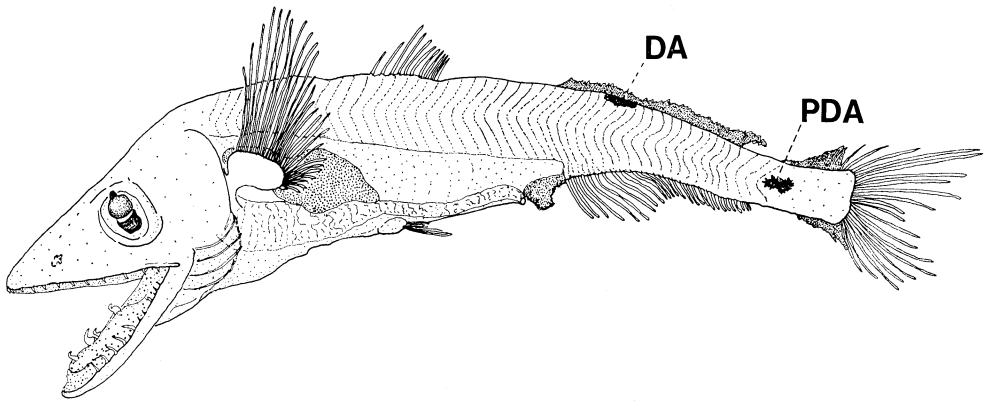

Fig. 1. *Rosenblattichthys nemotoi*, holotype, 37 mm SL, FMNH 96512.

pigment areas or spots: *R. volucris* has seven and *R. alatus* has five (Johnson, 1974: 97, 100). *R. nemotoi* most resembles *R. hubbsi* (Johnson, 1982: 161) in possessing only two pigment areas but differs in that the dorsal area (DA) is over the anterior one-third of the anal-fin base in *R. nemotoi* and over the posterior one-third of the anal-fin base in *R. hubbsi*. In *R. hubbsi* the lateral spot (CA) is an oblong dash of pigment at the fork of the caudal fin and in *R. nemotoi* the lateral accessory pigment area (PDA) is situated just behind a vertical through the posterior-most anal-fin-ray base, well in advance of the caudal-fin-ray bases. *R. volucris* is the only other *Rosenblattichthys* possessing a PDA, and in size and position the PDA areas appear identical in the two species. *R. volucris* also has two dorsal accessory area (DAA, DAP), two caudal accessory areas (AA, AP) (Johnson, 1974: 112), all lacking in *R. nemotoi*.

Meristic characters. Dorsal-fin rays 10, analfin rays 25, pectoral fin rays 26 or possibly 27, pelvic-fin rays 9, principal caudal-fin rays 19. Myotomes numbering at least 52 but exact count is precluded by uncertainty of counts in the posterior caudal peduncle (range of vertebral counts for other *Rosenblattichthys* is 46–51).

Proportional dimensions. Expressed as thousandths of the SL (37.0 mm). Body depth at dorsal-fin origin, 172. Caudal peduncle: least depth, 55; length, 129. Adipose fin, length of base, 245. Anal fin, length of base, 210. Dorsal fin: length of base, 57; end of dorsal-fin base to base of upper midcaudal fin ray, 520. Pectoral fin, length of longest ray, 142. Pelvic fin, distance from insertion to anal-fin origin, 185. Vent, distance from center to anal-fin origin, 52. Distance from snout to: vent, 584; anal-fin origin, 640; dorsal-fin origin, 490; pectoral-fin insertion, 301; pelvic-fin insertion, 451. Head length, 296. Snout length, 129. Eye: horizontal diameter, 43; vertical diameter, 69. Interorbital width, 52. Upper jaw length, 193. Lower jaw length, 228. Length of longest dentary tooth, 9.

Body. Larval; abdominal body wall membranous and translucent, not invested with muscle tissue. Myotomes clearly evident except becoming obscure in caudal-peduncle region. Postpelvic gut extending about three-fourths of distance from pelvic-fin insertion to anal-fin origin. No scales or scalelike structures yet developed.

Head. Typical larval features include long, pointed snout and incompletely developed tubular eye which has as yet no lens pad. Teeth small but well formed, uniserial on premaxillary, numbering 11. Dentary teeth biserial, 5 larger, inner teeth; about 10 smaller, outer teeth. Lingual teeth 4, restricted to elongate basihyal. Nasal rosette developed, about one-half the diameter of the lens.

Fins. All fins with differentiated rays except for ventral 1 or 2 pectoral-fin rays. Only two of the presumptive procurrent caudal-fin rays have developed, the remainder are represented by dorsal and ventral finfolds. There is a small triangular finfold extending between the vent and the anal-fin origin. As is typical for *Rosenblattichthys*, the adipose-fin base remains very elongate, extending from just in advance of a vertical through the anal-fin origin to a vertical through the base of the third from last anal-fin ray. Light pig-

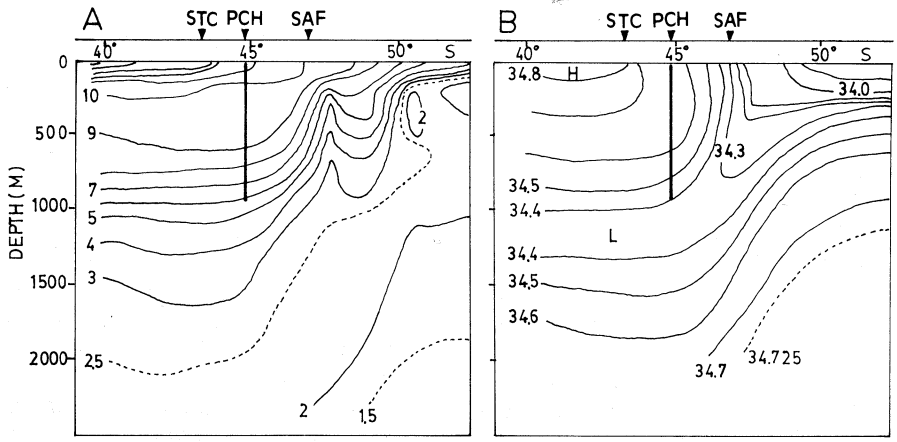

Fig. 2. Vertical distribution of (A) temperature (°C) and (B) salinity (‰) along 115°E longitude, 40°–65°S; during Australasian summer, 1983–1984 (from Nakai *et al.*, 1985, slightly modified). Locations of the position of capture of holotype (PCH) of *Rosenblattichthys nemotoi*, the Subtropical Convergence (STC) and the Subantarctic Front (SAF) are indicated by solid triangles. Vertical line below PCH shows depth range of collection.

mentation on pectoral fins, no pigment present on other fins. Pelvic fins entirely ventral to gut.

Peritoneal pigment. Only a single, rather large section is present and arranged as a canopy over the anterior saccular gut.

Accessory pigment areas. Two accessory pigment areas are present. A dorsal area (DA) in the middorsal body wall over anterior one-third of anal-fin base. A more elongate lateral peduncular area (PDA) centered on horizontal septum within anterior one-third of caudal-peduncle length.

Other pigmentation. Except for the densely-pigmented eye tube, there is no other pigmentation.

Transformation. Unknown but presumably, as in other species of *Rosenblattichthys,* changes leading to adult morphology occur over a wide size range. Onset of transformation in other *Rosenblattichthys* is indicated by reabsorption of ventral preanal finfold, reduction in length of base of adipose fin, extensive growth and posteriad expansion of stomach, appearance of dermal and epidermal pigmentation (Johnson, 1974: 20), expansion and ventral coalescence (left and right margins) of the peritoneal pigment section, and invasion of the ventral body wall by musculature. These events begin in specimens 18–20 mm SL in size in *R. alatus* and *R. hubbsi,* 28–30 mm SL in *R. volucris* (in which transformation is complete in specimens larger than 40 mm SL). In the holotype of *R. nemotoi,* 37.0 mm SL, none of these changes has begun.

Etymology. Named for Professor Takahisa Nemoto in honor of his great contributions to Antarctic biology, including his direction of the Cruise KH-83-4, which collected the single known specimen of this species.

Discussion

In previous studies of scopelarchids Johnson (1974, 1982) examined more than 1,800 lots from throughout the world ocean, including reasonably extensive Subtropical Convergence and Subantarctic material (Johnson, 1982: 153). *Rosenblattichthys nemotoi* was not represented. All previous records of the genus have been from tropical or subtropical waters. Two scopelarchid species are Antarctic-Subantarctic (*Benthalbella elongata* and *B. macropinna*), one is a presumed Subtropical Convergence Zone endemic (*Scopelarchoides kreffti,* still known only from the South Atlantic). With one known specimen, we can only speculate that *R. nemotoi* may be yet another member of Gibbs's (1968) proposed Subtropical Convergence Fauna (Transition-Zone faunas of Brinton, 1962; McGowan, 1971). The oceanographic data taken during Cruise KH-83-4 (Nakai *et al.*, 1985) seem to support this possibility, since the type locality was located in the rather narrow zone between the Subtropical Convergence and the Subantarctic Front (Fig. 2: the trawl depth at

station 7 spanned temperatures of 6–10°C and salinities of 34.4–34.7‰). The unexpected capture of this species in the very poorly sampled southern Indian Ocean (Johnson, 1982: 197) lends support to Gibbs *et al.*'s (1983: 128) plea that a major collecting expedition to the south Indian Ocean is greatly needed.

Johnson (1974: 208) used precocity of pectoral-fin development as a key synapomorphy uniting the then three known species of *Rosenblattichthys*. The state of this character in *R. nemotoi* is the primitive one, common to all other scopelarchids and most other inioms (Okiyama, 1984: 256). If and when additional specimens, including post-transformation specimens, of this species are ever taken, it would be of zoogeographic interest if the plesiomorphic sister-species of other *Rosenblattichthys* should prove to be a convergence zone endemic.

Acknowledgments

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南インド洋亜熱帯収束海域から採集されたデメエソ科の1新種 *Rosenblattichthys nemotoi*

沖山宗雄・Robert K. Johnson

南インド洋亜熱帯収束海域 (44°48.4′S, 114°57.3′W) から採集された1個体の稚魚標本，体長 37 mm，に基づいて新種 *Rosenblattichthys nemotoi* を記載した．本種は同属の既知種とは計数形質 (臀鰭条数 25，胸鰭条数 26–27)，付属色素域の配置 (背側域と側中線上の尾柄域の 2 個所に存在する) および非早成的胸鰭形成において異なる．本属の他種の記録はすべて 35°N (大西洋) と 35°S (太平洋) を限度とする海域にあることからみても，本新種の出現域は特異である．

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